

incapable of consciousness), evoke movements appropriate for escape from or removal of the stimulus applied. Now "feeling" is implicit in the emotional state; the state is an "affective state." In the evolution of emotion the revival of "feelings" pleasurable and painful must have played a large part. Hence the close relation of emotion with sense organs that can initiate bodily pain or pleasure, and hence its connection with impulsive or instinctive movement. There is no wide interval between the reflex movement of the spinal dog, whose foot attempts to scratch away an irritant applied to its back—both leg and back absolutely detached from consciousness—and the reaction of the decerebrate dog that turns and growls and bites at the fingers holding his hind foot too roughly. In the other case the motor reaction occurs, although the mind is not even aware of the stimulus, far less percipient of it as an irritant. The action occurs, and plays the pantomime of feeling; but no feeling comes to pass. In the latter case the motor reaction occurs, and is expressive of emotion; but it is probably the reaction of an organic machine, which can be started working, though the mutilation precludes the psychosis of emotion.

And with the gesture and the attitude will occur the visceral concomitant. It would be consonant with what we know of reflex action if the spur that started the muscular expression should simultaneously and of itself initiate, also, the visceral adjunct reaction. It is almost impossible to believe that with the mere stump of brain that remained to Goltz's dog there could be any elaboration of a percept. All trace of memory was lacking to the creature. Yet though not evincing other emotion, anger it showed as far as expression can yield revelation. Fear, joy, affection seem, therefore, in the observation of this skilled observer of animal mind, to demand higher nervous organisation than does anger. Be that as it may, the retention of its expression by Goltz's dog indicates that by "retrogradation" the complex movement of expression has in certain emotions passed into a simple reflex act. When the habituating practice of acts is carried far the determining motives finally become, even in impulsive acts, weaker and more transient. The external stimulus originally aroused a strongly affective group of ideas, which operated as a motive, but now it causes a discharge of the act before it can be apprehended as an idea. The impulsive movement of a "lower," "coarser," so-called "animal" emotion, has in this case become an automatic reflex process no longer necessarily combined with the psychological state whence it arose, of which it is normally at once the adjunct and the symbol.

C. S. SHERRINGTON.

THE CENTENARY OF THE ROYAL COLLEGE OF SURGEONS.

MR. VICTOR PLARR'S article, in last week's NATURE, on the celebration of the centenary of the Royal College of Surgeons of England contained a brief statement of the ceremonies which were to commence on the day we went to press. The proceedings were opened on Wednesday morning, July 25, when demonstrations were given in the Hunterian Museum of the College by the conservator, Prof. C. Stewart, F.R.S., who conducted visitors round the galleries, pointing out and describing some of the more important and interesting specimens. At the same time, in the theatre of the Examination Hall, Dr. T. G. Brodie, director of the laboratories of the Conjoint Board, gave an account of some of the work recently carried out in the research laboratories. In the evening a conversazione was held at the College, and was attended by many distinguished guests. Demonstrations were again given by Prof. Stewart and Dr. Brodie on Thursday morning; and in the afternoon, Sir William MacCormack, the president, delivered an address of welcome, and presented the diploma of Honorary Fellow to the Marquis of Salisbury and the Earl of Rosebery. As already stated (p. 294), the Prince of Wales received the diploma on July 24; and the form of the Royal diploma is the same as that employed for all the Honorary Fellowships.

The following is the list of other Honorary Fellows to whom diplomas were presented on Thursday:—E. Albert, professor of clinical surgery, University of Vienna; C. B. Ball, Regius professor of surgery, University of Dublin; E. Bassini, professor of clinical surgery, Royal University of Padua; E. H. Bennett, professor of surgery, Trinity College, Dublin; J. W. Berg, professor of surgery, Royal Caroline Institute of Medicine and Surgery, Stockholm; Prof. von Bergmann, Berlin; O. Bloch, professor

of surgery, University of Copenhagen; E. Bottini, professor of clinical surgery, Royal University of Pavia; I. H. Cameron, professor of clinical surgery, University of Toronto; Dr. Salvador Cardenal Fernandez, vice-president, Royal Academy of Medicine and Surgery, Barcelona; Antonino D'Antona, professor of surgery, Royal University of Naples; Francesco Durante, professor of clinical surgery, Royal University of Rome; Prof. Dr. Friedrich von Esmarch, Kiel; W. S. Halsted, professor of surgery, Johns Hopkins University, Baltimore; Hon. Sir W. H. Hingston, professor of clinical surgery, University of Laval; Surgeon-General James Jameson, C.B., Director-General, Army Medical Service; W. W. Keen, professor of the principles of surgery and of clinical surgery, Jefferson Medical College, Philadelphia; Theodor Kocher, professor of surgery, University of Bern; Prof. Dr. Franz König, Berlin; Prof. Kosinskij, professor of surgery in the University of Warsaw; Prof. Dr. E. G. F. Küster, Marburg; Elie Lambotte, Brussels; Odilon Marc Lannelongue, professor of surgical pathology, Faculty of Medicine of Paris; Karl Gustaf Lennander, professor of surgery and obstetrics, University of Upsala; W. Macewen, F.R.S., Regius professor of surgery, University of Glasgow; Colonel Kenneth MacLeod, professor of clinical and military medicine, Army Medical School, Netley; Julius Nicolaysen, professor of surgery, Royal University of Christiania; Sir Henry Frederick Norbury, K.C.B., Director-General, Medical Department of the Royal Navy; Leopold Ollier, professor of clinical surgery, University of Lyons; Victor Pachoutine, president, Imperial Military Academy of Medicine, St. Petersburg; Samuel Pozzi, professor in the Faculty of Medicine of Paris; Colonel D. C. O'Connell Raye, Indian Medical Service; T. G. Roddick, professor of surgery, McGill University, Montreal; Federico Rubio y Gali, member of the Royal Academy of Medicine of Madrid; Nicolas Wassilievitch Sklifossovsky, director and Emeritus professor, Imperial Clinical Institute of the Grand Duchess Helena Pavlovna, St. Petersburg; Paul Tillaux, professor of clinical surgery, Faculty of Medicine of Paris; Nicolas Veliaminoff, professor of surgery, Imperial Military Academy of Medicine, St. Petersburg; John Collins Warren, professor of surgery, Harvard University; Robert Fulton Weir, professor of clinical surgery, Columbia University, New York. After the presentation brief addresses of thanks were delivered by Prof. v. Bergmann of Berlin, Prof. Durante of Rome, Dr. W. W. Keen of Philadelphia, Prof. Lannelongue, and Dr. T. G. Roddick of Montreal.

FACTS OF INHERITANCE.¹

ONE of the distinctive features of the nineteenth century has been a reduction in the number of supposed separate powers or entities—the use of William of Occam's razor, in fact. In view of this progress towards greater precision of phraseology, it cannot be a matter for surprise that a biologist should affirm that to speak of the "Principle of Heredity" in organisms is like speaking of the "Principle of Horology" in clocks. For heredity is certainly no power or force, or principle, but a convenient term for the relation of organic or genetic continuity which binds generation to generation.

Another distinctive feature in scientific progress has been the introduction of precise measurement. In the development of natural knowledge, science begins where measurement begins. This is the case in regard to inheritance. While nothing can take the place of experiment, much has been gained by the application of statistical and mathematical methods to biological results—a new contact between different disciplines—which we may particularly associate with the names of Mr. Francis Galton and Mr. Karl Pearson.

I. THE PHYSICAL BASIS OF INHERITANCE.

What was for so long quite hidden from inquiring minds, or but dimly discerned by a few, is now one of the most marvellous of biological commonplaces—that the individual life of the great majority of plants and animals begins in the union of two minute elements—the sperm-cell and the egg-cell. If inheritance includes all that the living creature is or has to start with in virtue of its genetic relation to its parents and ancestors, then it is

¹ Abridged from a discourse delivered at the Royal Institution on Friday, March 30, by Prof. J. Arthur Thomson, F.R.S.